

What is claimed is:

1. A method for providing a self cooling modified atmosphere package for a floral grouping to increase the life of the floral grouping packaged therein, the method comprising the steps of:

providing a floral grouping disposed in a pot;

providing a laminated sheet of material constructed from a first sheet of material, a second sheet of material and a third sheet of material, the first sheet of material and the second sheet of material having modified atmosphere characteristics, the third sheet of material being capable of being punctured, torn, penetrated, or ruptured without disturbing the first and second sheets of material, the first, second and third sheets of material are disposed such that the laminated sheet of material is provided with a first chamber separated from a second chamber, the first chamber having a first chemical disposed therein and the second chamber having a second chemical disposed therein, the first chemical and the second chemical coordinated such that upon the breaking of the third sheet of material, the first chemical and the second chemical combine and produce an endothermic reaction;

forming the laminated sheet of material into a partially closed package having an open first end, a closed second end, and a sidewall, the

second end and the sidewall cooperating to define a floral grouping retaining space openly communicating with the open first end of the partially closed package, the partially closed package also having a bonding material present on a portion thereof;

disposing the pot containing the floral grouping into the floral grouping retaining space of the partially closed package;

closing at least a portion of the open first end;

injecting a modified atmosphere into the floral grouping retaining space of the partially closed package;

breaking the third sheet of material such that the first chemical and the second chemical combine and produce an endothermic reaction;

and

sealing the partially closed package to provide a self cooling modified atmosphere package for the floral grouping disposed in the pot, thereby increasing the life of the floral grouping.

2. The method of claim 1 wherein the step of injection, the modified atmosphere, the modified atmosphere is further defined as containing an oxygen concentration ranging from 0% to about 21% by volume, a carbon dioxide concentration ranging from 0% to about 30% by volume, and the

remaining concentration of the modified atmosphere being substantially nitrogen.

3. The method of claim 1 wherein in the laminated sheet of material has fluid impermeable perforations present on a portion thereof.

4. The method of claim 3 further comprising the steps of tearing the self cooling modified atmosphere package along the fluid impermeable perforations to open the self cooling modified atmosphere package and removing the floral grouping disposed in the pot from the self cooling modified atmosphere package.

5. The method of claim 1 wherein in the first chemical is defined as ammonium nitrate and the second chemical is defined as water.

6. The method of claim 1 wherein the step of providing the laminated sheet of material, the first chamber is of a larger volume than the second chamber.

7. The method of claim 1 within the step of providing the laminated sheet of material, the laminated sheet of material includes a plurality of second chambers.

8. The method of claim 1 within the step of providing the laminated sheet of material, the third sheet of material includes a plurality of separating elements.

9. The method of claim 1 within the step of providing the laminated sheet of material, the first chemical is potassium nitrate and the second chemical water.

10. The method of claim 1 within the step of providing the laminated sheet of material, the first chemical is ammonium chloride and the second chemical water.

11. The method of claim 1 within the step of providing the laminated sheet of material, the first chemical is ammonium thiocyanate and the second chemical is barium hydroxide.

12. The method of claim 1 wherein the floral grouping is carnations, and the modified atmosphere contains an oxygen concentration ranging from about 0.5% to about 21% by volume, a carbon dioxide concentration ranging from about 4% to about 20% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

13. The method of claim 1 wherein the floral grouping is roses, and the modified atmosphere contains an oxygen concentration ranging from about 0.5% to about 21% by volume, a carbon dioxide concentration ranging from about 5% to about 30% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

14. The method of claim 1 wherein the floral grouping is orchids, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 21% by volume, a carbon dioxide concentration ranging from 0% to about 2% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

15. The method of claim 1 wherein the floral grouping is tulips, and the modified atmosphere contains an oxygen concentration ranging from about 3% to about 21% by volume, a carbon dioxide concentration ranging from 0% to

about 5% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

16. The method of claim 1 wherein in the step of injecting a modified atmosphere into the floral grouping retaining space of the package, the modified atmosphere contains an oxygen concentration ranging from 0% to about 10% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

17. The method of claim 16 wherein the floral grouping is narcissus, and the modified atmosphere contains 100% nitrogen.

18. The method of claim 16 wherein the floral grouping is daffodils, and the modified atmosphere contains an oxygen concentration ranging from 0% to about 3% by volume.

19. The method of claim 16 wherein the floral grouping is anthurium, and the modified atmosphere contains an oxygen concentration ranging from about 2% to about 10% by volume.

20. The method of claim 16 wherein the floral grouping is chrysanthemum, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 2% by volume.

21. The method of claim 16 wherein the floral grouping is mimosa, and the modified atmosphere contains an oxygen concentration ranging from about 7% to about 8% by volume.

22. The method of claim 1 wherein in the step of injecting a modified atmosphere into the floral grouping retaining space of the package, the modified atmosphere contains an oxygen concentration ranging from about 1% to about 3% by volume, a carbon dioxide concentration ranging from 0% to about 15% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

23. The method of claim 22 wherein the floral grouping is gladiolus, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 3% by volume and a carbon dioxide concentration ranging from about 5% to about 15% by volume.

24. The method of claim 22 wherein the floral grouping is snapdragon, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 2% by volume and a carbon dioxide concentration ranging from 0% to about 15% by volume.

25. The method of claim 1 wherein in the step of injecting a modified atmosphere into the floral grouping retaining space of the package, the modified atmosphere contains an oxygen concentration of about 21% by volume, a carbon dioxide concentration ranging from about 8% to about 30% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

26. The method of claim 25 wherein the floral grouping is lilies, and the modified atmosphere contains a carbon dioxide concentration ranging from about 10% to about 20% by volume.

27. The method of claim 25 wherein the floral grouping is ferns, and the modified atmosphere contains a carbon dioxide concentration ranging from about 15% to about 30% by volume.



28. The method of claim 25 wherein the floral grouping is freesia, and the modified atmosphere contains a carbon dioxide concentration ranging from about 8% to about 12% by volume.

29. The method of claim 1 further comprising disposing at least one floral grouping maintenance agent into the package with the floral grouping prior to sealing the first end of the package, the at least one floral grouping maintenance agent selected from the group consisting of a cryo protectant, disinfectant, an anti-ethylene agent, an anti-static agent, a water-containing sponge, a cooling enzyme, a carbon dioxide scrubber, a floral holding material, and combinations thereof.

30. The method of claim 29 wherein the cryo protectant is selected from the group consisting of propylene glycol, dimethyl sulfoxide, sodium chloride, calcium chloride, mcp, sts, and ethylene glycol.

31. The method of claim 29 wherein the cryo protectant disinfectant is selected from the group consisting of 8-hydroxyquinoline sulfate, 8-hydroxyquinoline citrate, iprodione, procymidone, vinclozolin, prochloraz, amphyd, sodium hypochlorite, copper sulfate, silver nitrate, silver thiosulfate,

thiobendazole, zinc acetate, chlorpyrifos, methyl bromide, aluminum sulfate, aluminum nitrate, and combinations thereof.

32. The method of claim 29 wherein the anti-ethylene agent is selected from the group consisting of a potassium permanganate-containing ethylene scrubber, activated brominated charcoal, ethylene oxide, aminoethoxyvinylglycine, sodium thiosulfate, sodium benzoate, carbonyl cyanide, cycloheximide, 1-methylcyclopropene, a substituted benzothiadiazole, a gibberellin, a cytokinin, and combinations thereof.

33. The method of claim 29 wherein the carbon dioxide scrubber is selected from the group consisting of sodium hydroxide, water, activated charcoal, hydrated lime, a molecular sieve, and combinations thereof.

34. The method of claim 1 wherein the modified atmosphere and the floral grouping disposed in the pot present in the modified atmosphere package are maintained at a temperature in the range of from about 32 to 60 degrees Fahrenheit.

35. The method of claim 1 wherein the relative humidity of the modified atmosphere provided in the self cooling modified atmosphere package is about 80% to about 90%.

36. The method of claim 1 wherein in the step of providing the first sheet of material and the second sheet of material further includes a surface packaging agent present of the first sheet of material and the second sheet of material.

37. The method of claim 36 wherein in the step of providing a package, the package has fluid impermeable perforations on a portion thereof.

38. The method of claim 36 further comprising the steps of tearing the self cooling modified atmosphere package along the perforations to open the self cooling modified atmosphere package and removing the floral grouping disposed in the pot from the self cooling modified atmosphere package.

39. The method of claim 36 wherein the floral grouping is carnations, and the modified atmosphere contains an oxygen concentration ranging from about 0.5% to about 21% by volume, a carbon dioxide concentration ranging

from about 4% to about 20% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

40. The method of claim 36 wherein the floral grouping is roses, and the modified atmosphere contains an oxygen concentration ranging from about 0.5% to about 21% by volume, a carbon dioxide concentration ranging from about 5% to about 30% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

41. The method of claim 36 wherein the floral grouping is orchids, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 21% by volume, a carbon dioxide concentration ranging from 0% to about 2% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

42. The method of claim 36 wherein the floral grouping is tulips, and the modified atmosphere contains an oxygen concentration ranging from about 3% to about 21% by volume, a carbon dioxide concentration ranging from 0% to about 5% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

43. The method of claim 36 wherein in the step of injecting a modified atmosphere into the floral grouping retaining space of the package, the modified atmosphere contains an oxygen concentration ranging from 0% to about 10% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

44. The method of claim 43 wherein the floral grouping is narcissus, and the modified atmosphere contains 100% molecular nitrogen.

45. The method of claim 43 wherein the floral grouping is daffodils, and the modified atmosphere contains an oxygen concentration ranging from 0% to about 3% by volume.

46. The method of claim 43 wherein the floral grouping is anthurium, and the modified atmosphere contains an oxygen concentration ranging from about 2% to about 10% by volume.

47. The method of claim 43 wherein the floral grouping is chrysanthemum, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 2% by volume.

48. The method of claim 43 wherein the floral grouping is mimosa, and the modified atmosphere contains an oxygen concentration ranging from about 7% to about 8% by volume.

49. The method of claim 36 wherein in the step of injecting a modified atmosphere into the floral grouping retaining space of the package, the modified atmosphere contains an oxygen concentration ranging from about 1% to about 3% by volume, a carbon dioxide concentration ranging from 0% to about 15% by volume; and the remaining concentration of the modified atmosphere being substantially all nitrogen.

50. The method of claim 49 wherein the floral grouping is gladiolus, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 3% by volume and a carbon dioxide concentration ranging from about 5% to about 15% by volume.

51. The method of claim 49 wherein the floral grouping is snapdragon, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 2% by volume and a carbon dioxide concentration ranging from 0% to about 15% by volume.

52. The method of claim 49 wherein in the step of injecting a modified atmosphere into the floral grouping retaining space of the package, the modified atmosphere contains an oxygen concentration of about 21% by volume, a carbon dioxide concentration ranging from about 8% to about 30% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

53. The method of claim 52 wherein the floral grouping is lilies, and the modified atmosphere contains a carbon dioxide concentration ranging from about 10% to about 20% by volume.

54. The method of claim 52 wherein the floral grouping is ferns, and the modified atmosphere contains a carbon dioxide concentration ranging from about 15% to about 30% by volume.

55. The method of claim 52 wherein the floral grouping is freesia, and the modified atmosphere contains a carbon dioxide concentration ranging from about 8% to about 12% by volume.

56. The method of claim 36 wherein the surface packaging agent is selected from the group consisting of a disinfectant, a desiccant, an anti-fogging agent, an anti-ethylene agent, a cooling enzyme, and combinations thereof.

57. The method of claim 56 wherein the disinfectant is selected from the group consisting of 8-hydroxyquinoline sulfate, 8-hydroxyquinoline citrate, iprodione, procymidone, vinclozolin, prochloraz, amphyl, sodium hypochlorite, copper sulfate, silver nitrate, silver thiosulfate, thiobendazole, zinc acetate, chlorpyrifos, methyl bromide, aluminum sulfate, aluminum nitrate, and combinations thereof.

58. The method of claim 56 wherein the desiccant is selected from the group consisting of calcium chloride, silica gel, and combinations thereof.

59. The method of claim 56 wherein the anti-ethylene agent is selected from the group consisting of a potassium permanganate-containing ethylene scrubber, activated brominated charcoal, ethylene oxide, aminoethoxyvinylglycine, sodium thiosulfate, sodium benzoate, carbonyl cyanide, cycloheximide, 1-methylcyclopropene, a substituted benzothiadiazole, a gibberellin, a cytokinin, and combinations thereof.



60. The method of claim 56 wherein the self cooled modified atmosphere package and thus the floral grouping contained in the pot disposed therein are maintained at a temperature in the range of from about 32 to 60 degrees Fahrenheit.

61. The method of claim 36 wherein the relative humidity of the modified atmosphere within the self cooled modified atmosphere package is about 80% to about 90%.

62. The method of claim 36 further including the step of disposing within the package at least one floral grouping maintenance agent.

63. The method of claim 62 wherein in the step of providing a package, the package has fluid impermeable perforations present on a portion thereof.

64. The method of claim 63 further comprising the steps of tearing the self cooled modified atmosphere package along the fluid, impermeable perforations to open the self cooled modified atmosphere package and removing the floral grouping disposed in the pot from the self cooled modified atmosphere package.

65. The method of claim 62 wherein the floral grouping is carnations, and the modified atmosphere contains an oxygen concentration ranging from about 0.5% to about 21% by volume, a carbon dioxide concentration ranging from about 4% to about 20% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

66. The method of claim 62 wherein the floral grouping is roses, and the modified atmosphere contains an oxygen concentration ranging from about 0.5% to about 21% by volume, a carbon dioxide concentration ranging from about 5% to about 30% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

67. The method of claim 62 wherein the floral grouping is orchids, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 21% by volume, a carbon dioxide concentration ranging from 0% to about 2% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

68. The method of claim 62 wherein the floral grouping is tulips, and the modified atmosphere contains an oxygen concentration ranging from about 3% to about 21% by volume, a carbon dioxide concentration ranging from 0%

to about 5% by volume; and the remaining concentration of the modified atmosphere being substantially all nitrogen.

69. The method of claim 62 wherein in the step of injecting a modified atmosphere into the floral grouping retaining space of the package, the modified atmosphere contains an oxygen concentration ranging from 0% to about 10% by volume and the remaining concentration of the modified atmosphere being substantially all nitrogen.

70. The method of claim 69 wherein the floral grouping is narcissus, and the modified atmosphere contains 100% nitrogen.

71. The method of claim 69 wherein the floral grouping is daffodils, and the modified atmosphere contains an oxygen concentration ranging from 0% to about 3% by volume.

72. The method of claim 69 wherein the floral grouping is anthurium, and the modified atmosphere contains an oxygen concentration ranging from about 2% to about 10% by volume.

73. The method of claim 69 wherein the floral grouping is chrysanthemum, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 2% by volume.

74. The method of claim 69 wherein the floral grouping is mimosa, and the modified atmosphere contains an oxygen concentration ranging from about 7% to about 8% by volume.

75. The method of claim 62 wherein in the step of injecting a modified atmosphere into the floral grouping retaining space of the package, the modified atmosphere contains an oxygen concentration ranging from about 1% to about 3% by volume, a carbon dioxide concentration ranging from 0% to about 15% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

76. The method of claim 75 wherein the floral grouping is gladiolus, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 3% by volume and a carbon dioxide concentration ranging from about 5% to about 15% by volume.

77. The method of claim 75 wherein the floral grouping is snapdragon, and the modified atmosphere contains an oxygen concentration ranging from about 1% to about 2% by volume and a carbon dioxide concentration ranging from 0% to about 15% by volume.

78. The method of claim 62 wherein in the step of injecting a modified atmosphere into the floral grouping retaining space of the package, the modified atmosphere contains an oxygen concentration of about 21% by volume, a carbon dioxide concentration ranging from about 8% to about 30% by volume, and the remaining concentration of the modified atmosphere being substantially all nitrogen.

79. The method of claim 78 wherein the floral grouping is lilies, and the modified atmosphere contains a carbon dioxide concentration ranging from about 10% to about 20% by volume.

80. The method of claim 78 wherein the floral grouping is ferns, and the modified atmosphere contains a carbon dioxide concentration ranging from about 15% to about 30% by volume.

81. The method of claim 78 wherein the floral grouping is freesia, and the modified atmosphere contains a carbon dioxide concentration ranging from about 8% to about 12% by volume.

82. The method of claim 62 wherein the surface packaging agent is selected from the group consisting of a disinfectant, a desiccant, an anti-fogging agent, an anti-ethylene agent, a cooling enzyme, and combinations thereof.

83. The method of claim 62 wherein the floral grouping maintenance agent is selected from the group consisting of a disinfectant, an anti-ethylene agent, an anti-static agent, a water-containing sponge, a carbon dioxide scrubber, a cooling enzyme, and combinations thereof.

84. The method of claim 82 wherein the disinfectant is selected from the group consisting of 8-hydroxyquinoline sulfate, 8-hydroxyquinoline citrate, iprodione, procymidone, vinclozolin, prochloraz, amphyd, sodium hypochlorite, copper sulfate, silver nitrate, silver thiosulfate, thiobendazole, zinc acetate, chlorpyrifos, methyl bromide, aluminum sulfate, aluminum nitrate, and combinations thereof.

85. The method of claim 83 wherein the disinfectant is selected from the group consisting of 8-hydroxyquinoline sulfate, 8-hydroxyquinoline citrate, iprodione, procymidone, vinclozolin, prochloraz, amphyl, sodium hypochlorite, copper sulfate, silver nitrate, silver thiosulfate, thiobendazole, zinc acetate, chlorpyrifos, methyl bromide, aluminum sulfate, aluminum nitrate, and combinations thereof.

86. The method of claim 82 wherein the desiccant is selected from the group consisting of calcium chloride, silica gel, and combinations thereof.

87. The method of claim 82 wherein the anti-ethylene agent is selected from the group consisting of a potassium permanganate-containing ethylene scrubber, activated brominated charcoal, ethylene oxide, aminoethoxyvinylglycine, sodium thiosulfate, sodium benzoate, carbonyl cyanide, cycloheximide, 1-methylcyclopropene, a substituted benzothiadiazole, a gibberellin, a cytokinin, and combinations thereof.

88. The method of claim 83 wherein the anti-ethylene agent is selected from the group consisting of a potassium permanganate-containing ethylene scrubber, activated brominated charcoal, ethylene oxide, aminoethoxyvinylglycine, sodium thiosulfate, sodium benzoate, carbonyl cyanide, cycloheximide, 1-methylcyclopropene, a substituted benzothiadiazole, a gibberellin, a cytokinin, and combinations thereof.

89. The method of claim 83 wherein the carbon dioxide scrubber is selected from the group consisting of sodium hydroxide, water, activated charcoal, hydrated lime, a molecular sieve, and combinations thereof.

90. The method of claim 62 wherein the self cooled modified atmosphere package and the floral grouping contained in the pot disposed therein are maintained at a temperature in the range of from about 32 to 60 degrees Fahrenheit.

91. The method of claim 62 wherein the relative humidity of the modified atmosphere provided in the self cooling modified atmosphere package is about 80% to about 90%.